

C/ means for setting the movement pitch of the laser beam at a value equal to an arrangement pitch of the thin film transistors or at a value larger by a factor of an integer than the arrangement pitch of the thin film transistors; and

means for previously positioning the insulating substrate such that any one of the boundaries of the overlapped portions of the irradiated regions is not overlapped on a channel region of each of the thin film transistors.

REMARKS

Claims 11-16 are pending in the application. In the Office Action of March 13, 2003, the Examiner made the following disposition:

- A.) Objected to the Title of the Invention.
- B.) Rejected claims 11, 12, 15, and 16 under 35 U.S.C. §103(a) as being unpatentable over *Kudo* in view of *Ko* and *Noguchi*.
- C.) Rejected claims 13 and 14 under 35 U.S.C. §103(a) as being unpatentable over *Kudo* in view of *Ko* and *Noguchi*, and further in view of *Kawashima*.

Applicants respectfully traverse the rejections and address the Examiner's disposition as follows:

A.) Objection to the Title of the Invention:

The Title of the Invention has been amended as per the Examiner's request to overcome the objection. Attached hereto is a marked-up version of the changes made to the specification and claims by this amendment. The attached page is captioned **"VERSION WITH MARKING TO SHOW CHANGES MADE"**.

Applicants respectfully submit the objection has been overcome and request that it be withdrawn.

B.) Rejection of claims 11, 12, 15, and 16 under 35 U.S.C. §103(a) as being unpatentable over *Kudo* in view of *Ko* and *Noguchi*:

Applicants respectfully disagree with the rejection.

Applicants' independent claim 11, as amended, claims a laser annealing apparatus comprising means for intermittently irradiating a pulsed laser beam formed in a band-shape along the longitudinal direction of the insulating substrate to the insulating substrate, and simultaneously moving the laser beam relative to the insulating substrate in the lateral direction with a specific movement pitch while partially overlapping regions irradiated with the laser beam

to each other. The overlapped portions of the irradiated regions have a band shape along the longitudinal direction. The pulsed laser beam irradiates the semiconducting thin film effecting the semiconducting thin film to spread in a longitudinal and a lateral direction across the surface of the insulating substrate and then crystallize.

This is clearly unlike *Kudo* in view of *Ko* and *Noguchi*, which fail to disclose or suggest a pulsed laser beam that irradiates a semiconducting thin film effecting the semiconducting thin film to spread in a longitudinal and a lateral direction across a surface of an insulating substrate and then crystallize.

Kudo discloses a method of manufacturing a polycrystalline silicon thin film, however unlike Applicants' claim 11, nowhere does *Kudo* disclose or suggest effecting a semiconducting thin film to spread in a longitudinal and a lateral direction across a surface of a substrate. Referring to *Kudo* Figure 3, *Kudo* discloses irradiating a sheet of semiconducting thin film. Square-shaped laser beams irradiate the thin film in an overlapping pattern. Unlike Applicants' claim 11, however, nowhere does *Kudo* disclose or even suggest that its laser beams effect the thin film to spread in any direction. Instead, *Kudo* merely teaches that its method improves surface roughness and crystal size uniformity.

Ko discloses obtaining a recrystallized thin film by irradiating the thin film a single time with a laser beam. Unlike Applicants' claim 11, however, nowhere does *Ko* disclose or suggest effecting a semiconducting thin film to spread in a longitudinal and a lateral direction across a surface of a substrate. Therefore, *Kudo* in view of *Ko* still fails to disclose or suggest Applicants' claim 11.

Noguchi et al. also fails to disclose or suggest effecting a semiconducting thin film to spread in a longitudinal and a lateral direction across a surface of a substrate. *Noguchi et al.* discloses various surface treatments, such as annealing, diffusion, oxidation, and nitridation. Unlike Applicants' claim 11, however, nowhere does *Noguchi et al.* disclose or suggest effecting a semiconducting thin film to spread in a longitudinal and a lateral direction across a surface of a substrate.

Therefore, *Kudo* in view of *Ko* and further in view of *Noguchi et al.* still fails to disclose or suggest Applicants' claim 11.

Claims 12, 15 and 16 depend directly or indirectly from claim 11 and are therefore allowable for at least the same reasons that claim 11 is allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

C.) Rejection of claims 13 and 14 under 35 U.S.C. §103(a) as being unpatentable over *Kudo* in view of *Ko* and *Noguchi*, and further in view of *Kawashima*:

Applicants respectfully disagree with the rejection.

Applicants' independent claim 11 is allowable over *Kudo* in view of *Ko* and *Noguchi*, as discussed above. *Kawashima* still fails to disclose or suggest effecting a semiconducting thin film to spread in a longitudinal and a lateral direction across a surface of a substrate. Therefore, claim 11 is allowable over *Kudo* in view of *Ko* and *Noguchi*, and further in view of *Kawashima*.

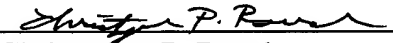
Claims 13 and 14 depend directly or indirectly from claim 11 and are therefore allowable for at least the same reasons that claim 11 is allowable.

Applicants respectfully submit the rejection has been overcome and request that it be withdrawn.

CONCLUSION

In view of the foregoing, it is submitted that claims 11-16 are patentable. It is therefore submitted that the application is in condition for allowance. Notice to that effect is respectfully requested.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

Please replace the Title of the Invention with the following replacement Title of the Invention:

--LASER ANNEALING APPARATUS[THIN FILM SEMICONDUCTOR DEVICE]--

In the Claims:

Please amend claim 11 as follows:

11. (Twice Amended) A laser annealing apparatus used for fabrication of a thin film semiconductor device integrately formed with a plurality of thin film transistors each of which includes as an active layer a semiconducting thin film which is formed on a surface of an insulating substrate spread in longitudinal and lateral directions across the surface of the insulating substrate and then crystallized, comprising:

means for intermittently irradiating a pulsed laser beam formed in a band-shape along the longitudinal direction of the insulating substrate to the insulating substrate, and simultaneously moving the laser beam relative to the insulating substrate in the lateral direction with a specific movement pitch while partially overlapping regions irradiated with the laser beam to each other, the overlapped portions of the irradiated regions having a band shape along the longitudinal direction, the pulsed laser beam irradiating the semiconducting thin film effecting the semiconducting thin film to spread in a longitudinal and a lateral direction across the surface of the insulating substrate and then crystallize;

means for setting the movement pitch of the laser beam at a value equal to an arrangement pitch of the thin film transistors or at a value larger by a factor of an integer than the arrangement pitch of the thin film transistors; and

means for previously positioning the insulating substrate such that any one of the boundaries of the overlapped portions of the irradiated regions is not overlapped on a channel region of each of the thin film transistors.

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited as First Class Mail in an envelope addressed to Commissioner for Patents, PO Box 1450, Alexandria, Virginia 22313-1450 on May 27, 2003.

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